

# **Alabama Head and Spinal Cord Injury Report**

January 1, 2006 – December 31, 2006

**Alabama Department of Public Health**

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## **Background**

According to the National Center for Health Statistics (NCHS), traumatic injuries cause more deaths among children and young adults than any other disease. The NCHS also reports that, in 2001, accidental injury alone ranks fifth overall nationally among causes of death. Moreover, when the components of traumatic injury, such as accidents, suicides, and homicides, are added together, they represent the fourth leading cause of mortality nationally. In fact, unintentional injuries result in the loss of more potential years of life, (age < 65 years) than any other cause.

The Alabama Department of Rehabilitation Services (ADRS) is charged with offering rehabilitation services to patients with moderate to severe brain, spinal cord, or other debilitating injury. At times, patients are unaware of or have difficulty understanding state supported rehabilitation services – the result of which leads to inadequate rehabilitation, disability management, and work force re-entry assistance. Patients who have sustained debilitating injuries are identified and linked with ADRS via the Alabama Head and Spinal Cord Injury Registry (AHSCIR), a registry mandated by Alabama Act 98-611. This law, which requires all hospitals in Alabama to submit data related to head and/or spinal cord injury cases to the Alabama Department of Public Health (ADPH), was passed in May of 1998. The Alabama Trauma Registry (ATR), established shortly after AHSCIR data collection began in 1999, strives to broaden collection efforts to include data related to all types of trauma. Since the trauma registry program began providing data to the ADRS in the year 2000, patients with moderate to severe traumatic brain injury and/or spinal cord injury have been identified and contacted. Those requesting services have been provided appropriate, need-based, referral information.

More specifically, development of the ATR component pertains to an expansion of the head and spinal cord injury registry into a larger, more comprehensive program. Trauma registry personnel at the Alabama Department of Public Health (ADPH), Office of Emergency Medical Services and Trauma (OEMST) collect statewide data by working with hospitals at all levels of trauma care (acute and ancillary). By working with trauma centers that devote significant resources to trauma care as well as working with hospitals that function to treat less severe traumatic injuries but stabilize and transfer more severe traumatic injuries, the ATR is beginning to capture data that will allow for more accurate evaluations regarding traumatic injury incidence and patterns. Ultimately, registry data analysis and injury pattern evaluations will permit researchers and policy makers to identify better ways of reducing injury mortality and morbidity in Alabama.

The ATR/AHSCIR program has completed all phases of hospital participation. Phase I included Alabama's seven major trauma centers (Huntsville Hospital, The University of Alabama at Birmingham Hospital, The Children's Hospital of Alabama, Carraway Methodist Medical Center, DCH Regional Medical Center, Southeast Alabama Medical Center, and the University of South Alabama Hospital). In Phase II the ATR began working with 18 additional hospitals, each of which treated 50 or more head and/or spinal cord injury cases annually. Phase III expanded the Registry to include contact with all remaining hospitals in Alabama who receive trauma cases. Hospitals

representing all phases have agreed to submit case data to the AHSCIR component whereas only the largest facilities and a few smaller hospitals submit all trauma data (ATR component).

It is important to provide the public with mortality and morbidity statistics associated with motor vehicle crashes in order to accurately illustrate the impact injuries have on individuals, families, and society. Additionally, the information assists with efforts related to increasing protective equipment usage rates. Trauma registry data are used by a variety of organizations. Emergency management agencies and emergency medical service providers use the registry information for community trauma prevention education. Other organizations such as ThinkFirst Alabama use registry information to help with public safety education programs. As previously described, the state department of rehabilitation services uses the AHSCIR data to locate patients suffering from head and/or spinal cord injuries in an effort to make them aware of state supported services and perform follow-up treatment.

Historically, the *Alabama Traffic Injury Registry (ATIR)*, which collected data from 1991 through 1998 from 18 hospital emergency departments, was able to generate and convey similar information; however, due to the small sample size and other limitations, it was not possible to draw broad conclusions with respect to statewide mortality and morbidity. *ATIR* data collection was labor intensive, required frequent travel to hospital emergency departments and was unable to capture all trauma cases treated at the 18 participating hospitals. The demographic characteristics of patients treated at hospitals from which the *ATIR* collected data were, simply put, not representative of the state as a whole. Therefore, it was not possible to accurately assess the extent of disparity for specific injury indicators such as; the Glasgow Coma Scale (GCS) scores, Abbreviated Injury Scale (AIS) scores, Injury Severity Scores (ISS) and functional ability at discharge of persons whose injuries were severe enough for admittance to the hospital. For obvious reasons, if hospital participation for the general trauma registry (ATR) is broad enough, more representative samples will be available which, in turn, will allow for more representative information regarding statewide injury – especially with regard to motor vehicle crash injury.

The Alabama Statewide Cancer Registry, located in the Bureau of Health Promotion and Chronic Disease, provides the ATR/AHSCIR staff with a successful example regarding registry operation and management. Collaboration between the ATR/AHSCIR and cancer registry staff contributed greatly to the development and operation of the trauma registry program. Also, the ATR/AHSCIR staff has consulted with staff and web-sites operated by other successful state registries. The ATR/AHSCIR has been modeled after these successful programs and proposes, in cooperation with a statewide emergency response program, to construct one of the most comprehensive trauma surveillance systems in the country.

## **Methods**

The case definition for inclusion in the ATR/AHSCIR program denotes any patient with at least one injury International Classification of Diseases, Ninth Revision (ICD-9-CM)

diagnosis codes between 800.00 and 959.9, excluding 905–909 (late effects of injury), 910-924 (blisters, contusions, abrasions, and insect bites), and 930-939 (foreign bodies). The patient must also have been admitted to the hospital for at least 24 hours, transferred into and/or out of the hospital, or died after receiving any evaluation or treatment or were dead upon arrival.

### **Data Use and Comparability**

All data contained in this report must be interpreted with careful judgment. It is important to note that the information presented in this report is based on data from the ATR, which, as of June 30, 2007, did not contain information from all acute care hospitals in the state. The data contained in this report cannot be construed to represent the state of Alabama as a whole, and is not comparable to state or federal data from other sources.

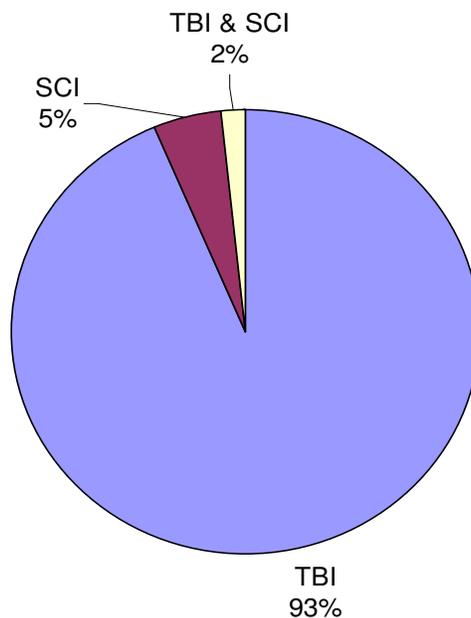
Less severe head and spinal cord injuries may be under-represented in this analysis since less severe injuries are not submitted to the registry due to the case definition specifics or registrar omission. Additionally, mortality may be under-estimated because of persons who have expired at the scene, in transit to a facility, or arrived at hospitals not yet participating in the program. The statistical significance of summary data for the Spinal Cord Injury (SCI) and combined Traumatic Brain Injury/Spinal Cord Injury (TBI/SCI) cases is also limited by the small population size regarding some respective data subgroups.

This *draft* report will be complete upon the inclusion of data collected by the Alabama Trauma Registry (ATR) using TraumaNet, internet-based data collection developed for use by the ATR.

# **RESULTS**

The ATR received reports of 2,586 head and spinal cord injury cases that were admitted to participating hospitals during calendar year 2006. Head injuries (TBI) constituted 94% (n = 2,441) of the reported cases and spinal cord injuries (SCI) constituted 4% (n =103). There were 42 cases (2%) in the Registry that had both head and spinal cord injuries. This document will use the term traumatic brain injury (TBI) when referring to head injuries. Separate analyses are presented for each of the three categories. All categories are mutually exclusive.

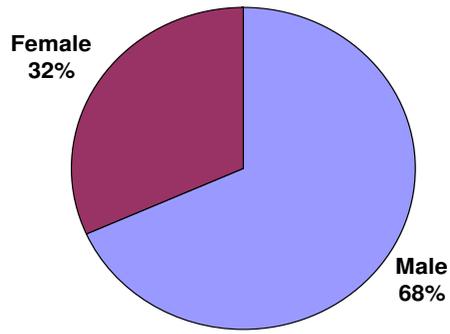
Figure 1  
**Type of Injury**  
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2005 – December 31, 2005  
(N = 2,609)



These three injury types will be analyzed separately in this report.

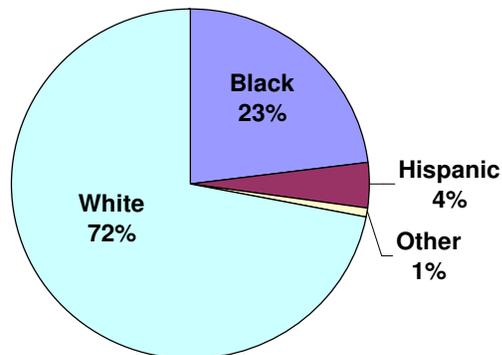
# **Traumatic Brain Injury**

**Figure 2**  
**Proportion of TBI Cases by Gender**  
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 2,441)



There were 2.2 times more male TBI cases (n = 1,665) than female cases (n = 773) reported to the ATR for calendar year 2006. Gender was not noted in 3 cases.

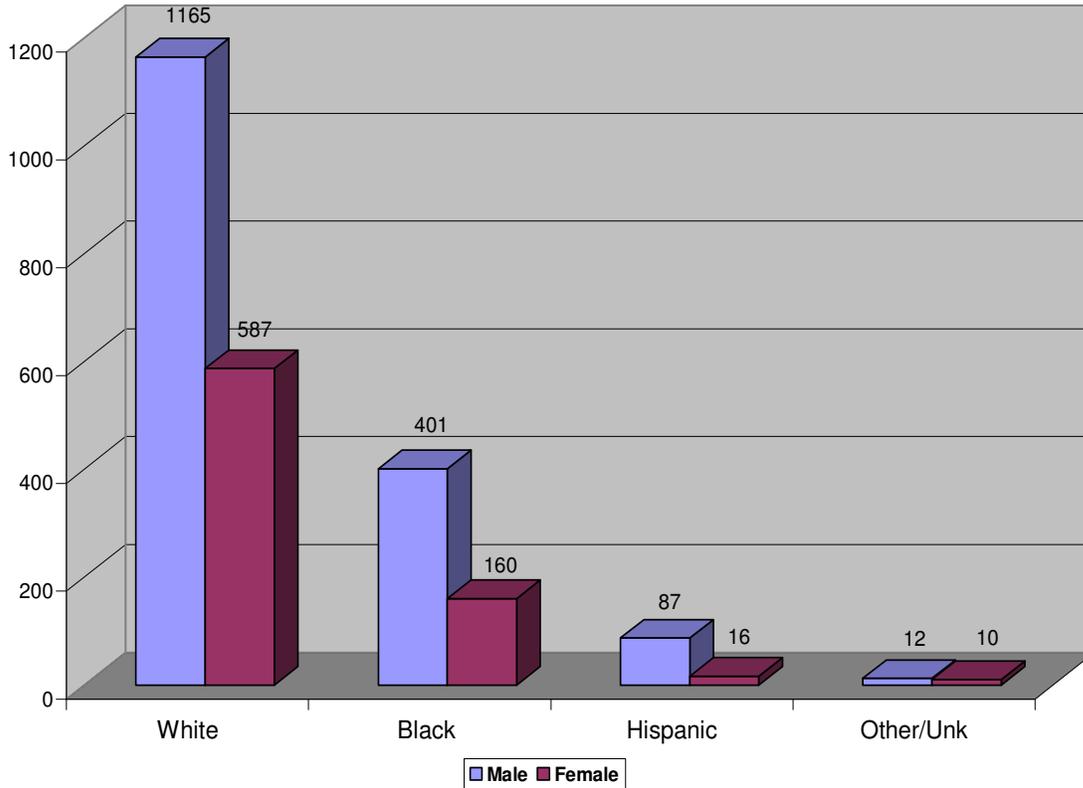
**Figure 3**  
**Proportion of TBI Cases by Ethnicity**  
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006– December 31, 2006  
(n = 2,441)



Whites constitute 72% (n = 1,753) of the cases, Blacks 22% (n = 561), and Hispanics 4% (n = 103) of TBI cases. The Other category comprises 2% (n = 24). Race was not noted in 9 cases.

Figure 4  
Number of TBI Cases by Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 2,441)



Sixty-six percent (n = 1,165) of TBI cases in whites were male, seventy-one percent (n = 401) of black cases were male, eighty-four percent (n = 87) in Hispanics were male, and fifty-four percent (n = 12) of the “Other” category were male. The overall percentages in this injury type were 68% male and 32% female (see Figure 2). Neither gender nor ethnicity was noted in 2 TBI cases.

**Table 1**  
**TBI Cases by Age, Gender & Race**

Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 2,441)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	37	12	25	13	8	2	97	2.94%
5 to 14	87	25	36	14	8	2	172	7.48%
15-24	290	161	96	36	31	6	620	23.80%
25-34	202	63	84	33	23	4	409	18.04%
35-44	170	81	59	25	16	5	356	13.58%
45-54	128	51	52	20	7	1	259	14.19%
55-64	107	54	30	6	2	2	201	7.93%
65-74	61	51	9	6	2	1	130	4.79%
75-84	58	63	10	4	2	1	138	5.15%
>84	24	24	0	3	0	2	53	1.80%
<b>Total</b>	1164	585	401	160	99	26	2435	99.71%
<b>% Total</b>	46.99	24.54	15.50	6.87	4.83	0.98	99.71	

According to 2005 U.S. census estimates, white males comprised 35.12% of the state population and white females comprised 36.26%. Males of all other ethnic groups combined made up 13.42% of the state population and females of all other ethnic groups combined made up 15.19%. In comparison, when the 2006 Alabama data is grouped similarly, white males comprise 46.99% of TBI admissions, white females 24.54%, other males 20.33%, and other females 7.85%. The ages of 6 TBI cases were not noted.

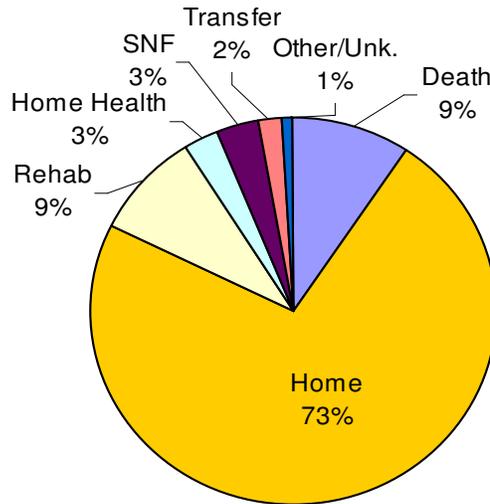
**Table 2**  
**2005 Estimated Alabama Population by Age, Gender & Race**

U.S. Bureau of the Census  
(N = 4,557,808)

Age	White Males	White Females	Other Males	Other Females	Total	% Total
<5	99,540	95,264	51,911	49,864	296,579	6.51%
5 to 14	202,287	190,700	104,742	102,307	600,036	13.17%
15-24	216,859	203,477	112,457	112,711	645,504	14.16%
25-34	213,885	206,607	87,156	99,396	607,044	13.32%
35-44	236,467	232,426	80,953	97,253	647,099	14.20%
45-54	238,251	241,611	81,196	98,096	659,154	14.46%
55-64	189,859	201,004	48,421	59,375	498,659	11.19%
65-74	121,676	142,769	26,580	38,091	329,116	7.22%
75-84	65,987	101,246	13,597	25,812	206,642	4.53%
>84	15,669	37,408	4,169	10,729	67,975	1.49%
<b>Total</b>	1,600,480	1,652,512	611,182	693,634	4,557,808	100.00%
<b>% Total</b>	35.12%	36.26%	13.42%	15.19%	100.00%	

**Figure 5**  
**Discharge Disposition Following TBI Cases**

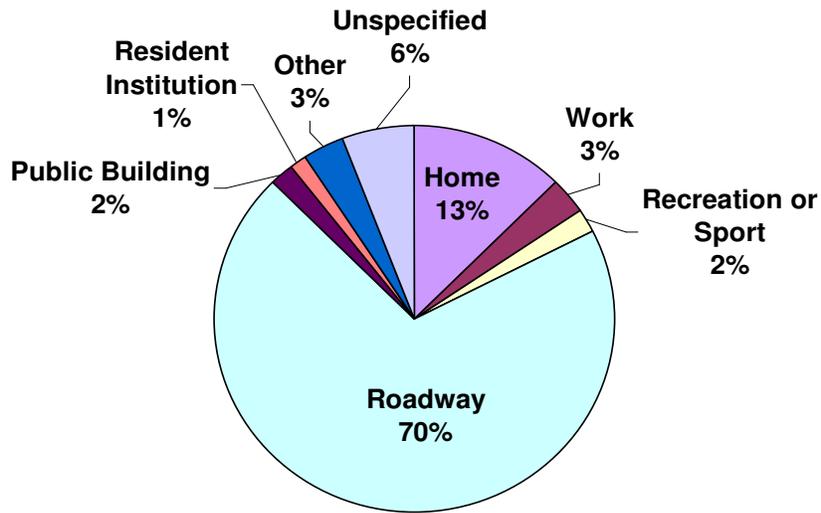
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 2,441)



By far the greatest portion of traumatic brained injury cases, seventy-three percent (n = 1779), were discharged home. From the data, it cannot be determined how many of these were referred to outpatient rehab facilities. Three percent (n = 70) were discharged to home health services. Nine percent (n = 230) of TBI cases died. Two percent (n = 42) were transferred to hospitals who did not submit data to the ATR. Nine percent (n = 212) were transferred to inpatient rehab facilities. Three percent (n = 85) were sent to skilled nursing facilities (SNF). The “Other” category includes psychiatric hospitals, jail, supervised living facilities, sub-acute care facilities and cases in which the discharge disposition was not specified.

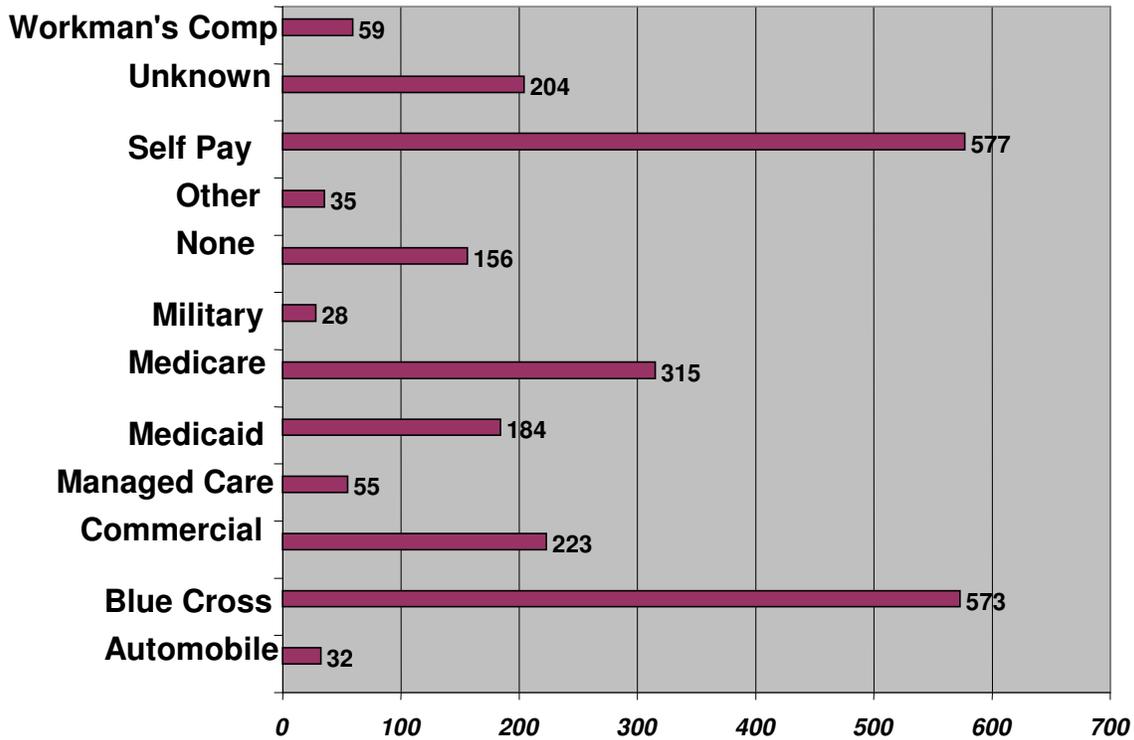
Figure 6  
**Site of Injury Occurrence in TBI Cases**

Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 2,441)



Most traumatic brain injuries reported to the ATR occurred on roads, streets and highways, seventy percent (n = 1,710). Thirteen percent (n = 308) occurred in the home, two percent (n = 48) in places for sports and recreation, two percent in public buildings (n = 50), three percent at work (n = 70), one percent in residential institutions such as hospitals and nursing homes (n = 32), and three percent (n = 81) in a variety of other settings. Six percent (n = 144) of cases had no site specified.

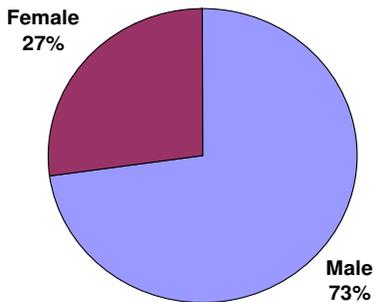
Figure 7  
**Payer Source for TBI Cases**  
 Alabama Head and Spinal Cord Registry (AHSCIR)  
 January 1, 2006 – December 31, 2006  
 (n = 2,441)



According to information sent to the ATR, the largest percentage of TBI cases, twenty-four percent (n = 577), were paid for by the injured individuals or their families. Only slightly less cases were covered by Blue Cross/Blue Shield plans which paid for 23% (n = 573). The costs were not covered in 6% (n = 156) of cases. Medicare and Medicaid paid in 13% (n = 315) and 8% (n = 184), respectively. Various commercial insurance companies were primary payers in 9% (n = 223) of TBI cases reported to the Registry. Workman's compensation was the primary payer in 2% (n = 59), automobile insurance was the primary payer in 1% (n = 32), and managed care plans were the primary payers in 2% (n = 55). The payment source was not documented in 8% (n = 204). The source of payment data sent to the ATR is particularly subject to misclassification for various reasons, e.g. the commercial group might include some managed care organizations or the primary payment source may not be properly submitted when there are multiple sources of payment.

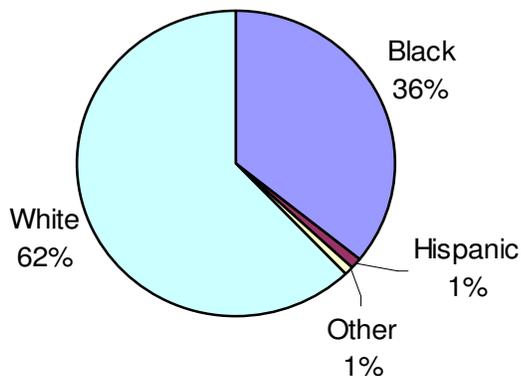
## **Spinal Cord Injury**

**Figure 8**  
**Proportion of SCI Cases by Gender**  
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 103)



There were 2.7 times more male SCI cases (n = 75) than female cases (n = 28) reported to the Alabama Trauma Registry for calendar year 2006.

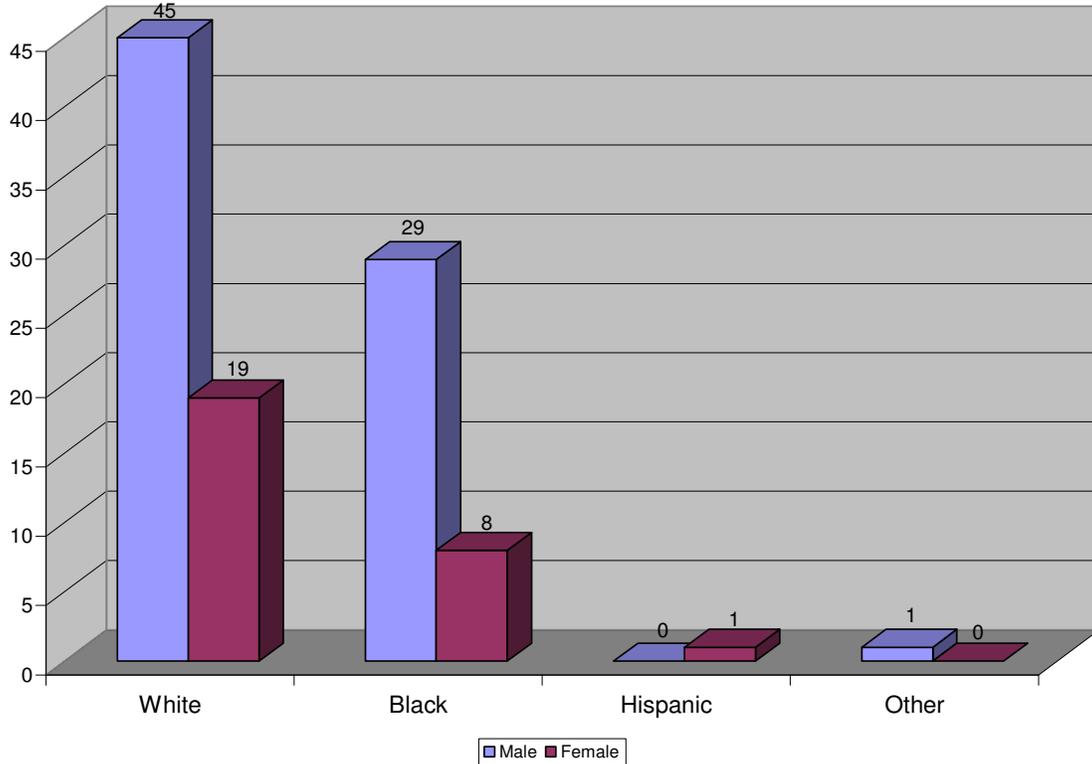
**Figure 9**  
**Proportion of SCI Cases by Race**  
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 103)



Whites constitute 62% (n = 64) of the SCI cases and Blacks 36% (n = 37). The remaining 2% of cases were of Hispanic (n = 1) and Other Unspecified (n = 1) ethnic origin.

Figure 10  
**Number of SCI Cases by Race and Gender**

Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 103)



Seventy percent (n = 45) of SCI cases in whites were male, seventy-eight percent (n = 29) in blacks were male. The only Hispanic case was female. The overall percentages in this injury type were 75% male and 25% female (see Figure 8).

**Table 3**  
**SCI Cases by Age, Gender & Race**

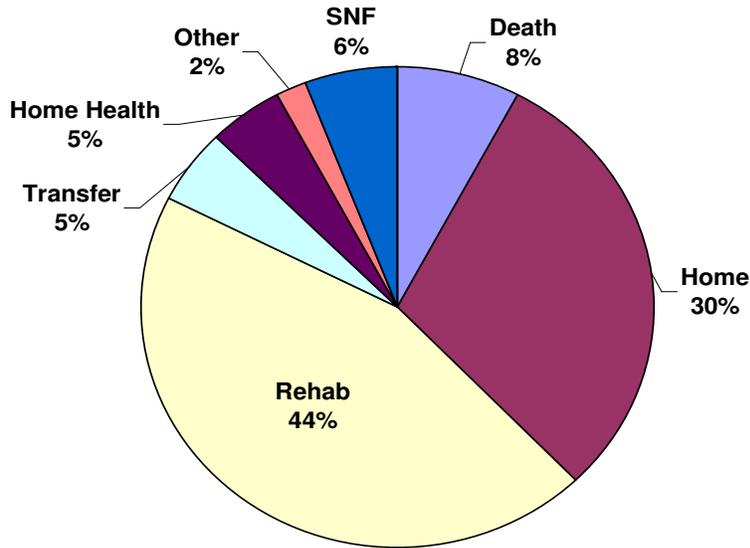
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n =121)

<b>Age</b>	<b>White Males</b>	<b>White Females</b>	<b>Black Males</b>	<b>Black Females</b>	<b>Other Males</b>	<b>Other Females</b>	<b>Total</b>	<b>% Total</b>
<5	0	1	0	0	0	0	1	0.97
5 to 14	0	0	0	2	0	0	2	1.94
15-24	14	5	11	1	0	1	32	31.07
25-34	8	3	6	2	0	0	19	18.45
35-44	3	3	6	1	0	0	13	12.62
45-54	10	1	5	0	1	0	17	16.50
55-64	5	2	1	0	0	0	8	7.77
65-74	1	0	0	0	0	0	1	0.97
75-84	2	3	0	2	0	0	7	6.77
>84	2	1	0	0	0	0	3	2.91
<i>Total</i>	45	19	29	8	1	1	103	100.00%
<i>% Total</i>	43.69	18.45	28.16	7.77	0.97	0.97	100.00	

According to 2005 U.S. census estimates, white males comprised 35.12% of the state population and white females comprised 36.26% (see Table 2). Males of all other ethnic groups combined made up 13.42% of the state population and females of all other ethnic groups combined made up 15.19% (Table 2). In comparison, when grouped similarly, white males represented 43.69% of 2006 SCI admissions reported to the ATR and white females comprise 18.45%. Other males comprise 29.13% and other females, 8.74%.

Figure 11  
**Discharge Disposition Following SCI Cases**

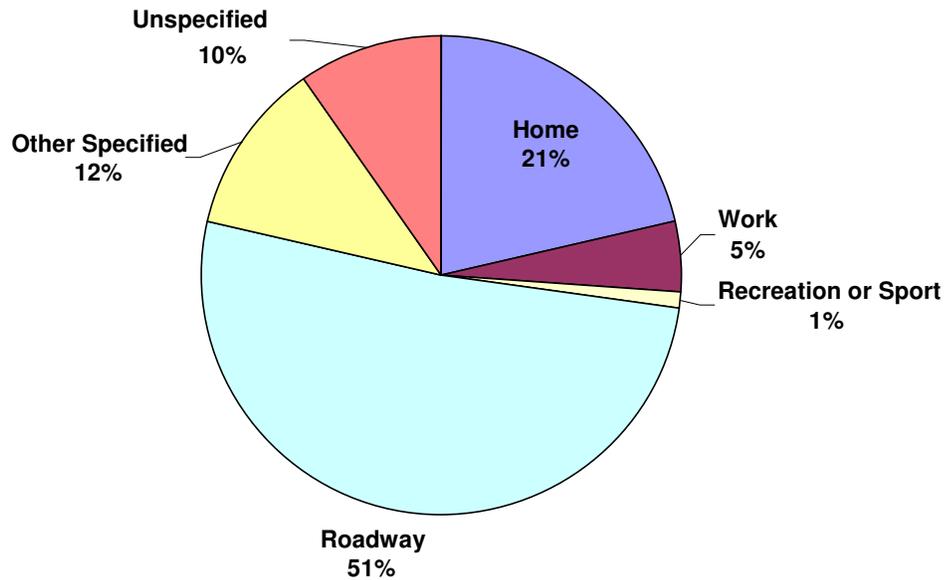
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 103)



Thirty percent (n = 31) were discharged home. Five percent (n = 5) were referred to home health services. Forty-four percent (n = 46) of SCI cases went to residential rehabilitation facilities and 6% (n = 6) went to skilled nursing facilities (SNFs). Eight percent (n = 8) of SCI cases died. The “Other” category contains 2 cases (2%), one of which was discharged to a psychiatric hospital and one who was discharged to jail. The remaining 5 cases (5%) were transferred to other acute care hospitals.

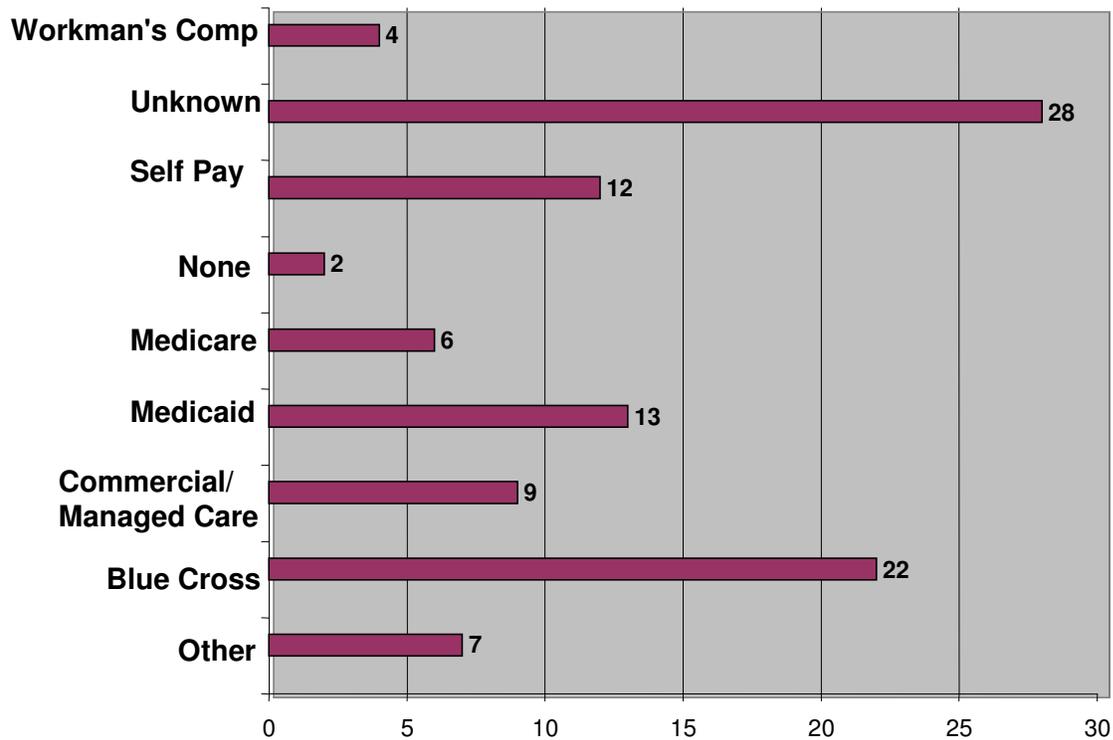
Figure 12  
**Site of Injury Occurrence in SCI Cases**

Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 121)



Most spinal cord injuries, 52% (n = 53), reported to the ATR occurred on streets and highways. Twenty-two percent (n = 22) occurred in private residences. Five percent (n = 5) occurred at work, and one percent (n = 1) in places for sports and recreation. Ten percent (n = 10) had no injury setting documented. The remaining 12% (n = 12) were in various other specified settings.

**Figure 13**  
**Payer Source for SCI Cases**  
 Alabama Head and Spinal Cord Registry (AHSCIR)  
 January 1, 2006 – December 31, 2006  
 (n = 103)

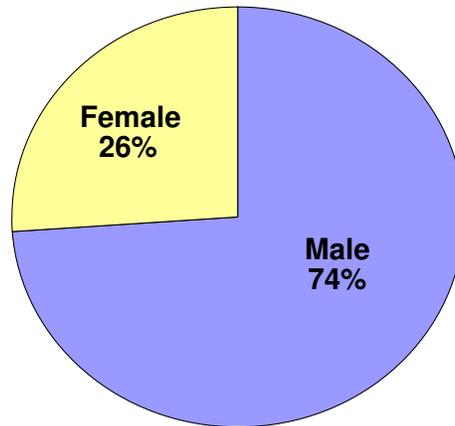


Blue Cross/Blue Shield was the most frequent primary payment source for SCI cases at 21% (n = 22). The injured individuals or their families paid in 12% (n = 12) of cases. Medicare and Medicaid paid in 6% (n = 6) and 13% (n = 13), respectively. The primary payer was private commercial insurance in 9% (n = 9) of cases. There was no payment in 2% (n = 2) of cases. Workman's compensation was the primary payer in 4% (n = 4) of cases. Various other sources of payment accounted for 7% (n = 7). The primary payer was unknown or not indicated in 27% (n = 28) of cases of this type.

## **Cases with Both Head and Spinal Cord Injuries**

Figure 14  
**Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Gender**

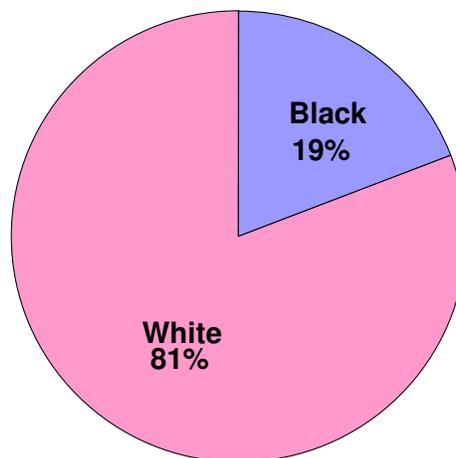
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 42)



There were 2.8 times more male cases (n = 31) with both head and spinal cord injuries than female cases (n = 11) reported to the Alabama Trauma Registry for calendar year 2006.

Figure 15  
**Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Race**

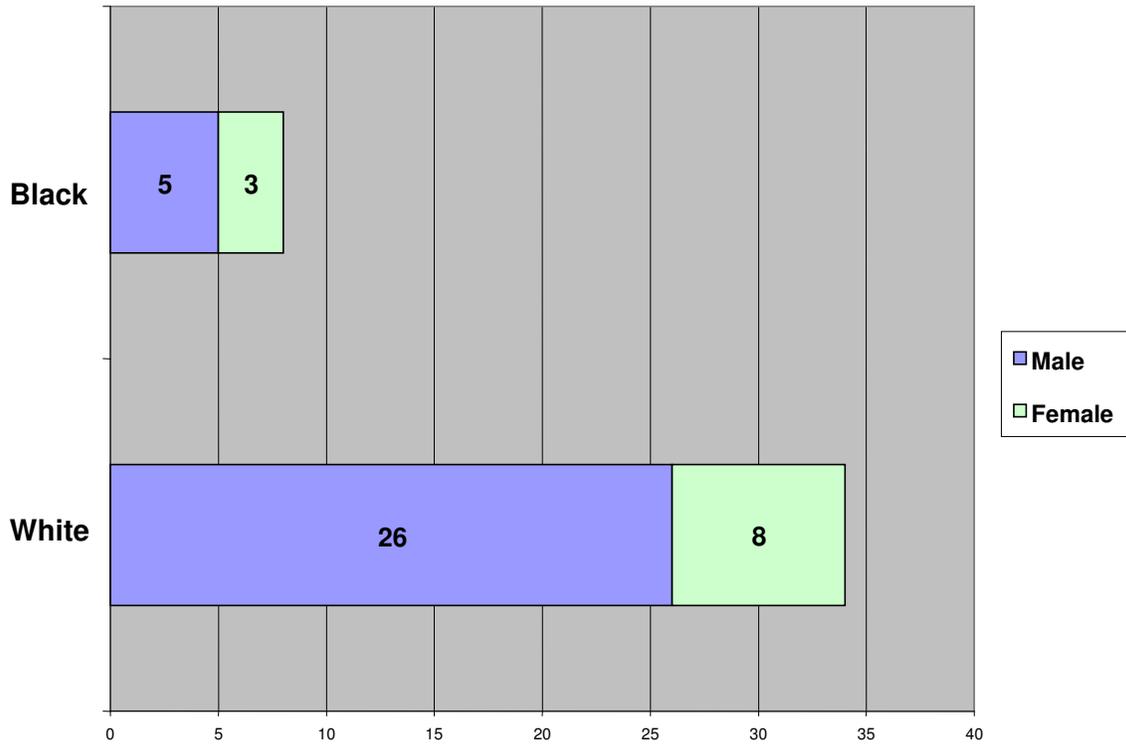
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 42)



Whites constitute 81% (n = 34) of the cases with both head and spinal cord injuries and Blacks 19% (n = 8).

Figure 16  
Number of Cases with Both TBI and SCI by Gender and Race

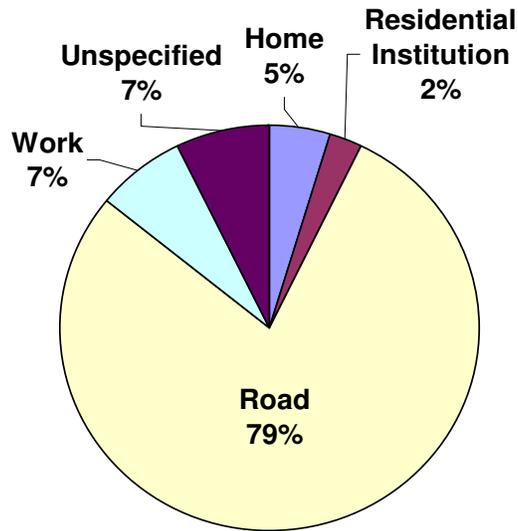
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 42)



Seventy-six percent (n = 26) of cases with both head and spinal cord injuries in whites were male and sixty-three percent (n = 5) in Blacks were male. The overall percentages in this injury type were 74% male and 26% female (see Figure 14).

Figure 17  
**Site of Injury Occurrence in Cases with Both TBI and SCI**

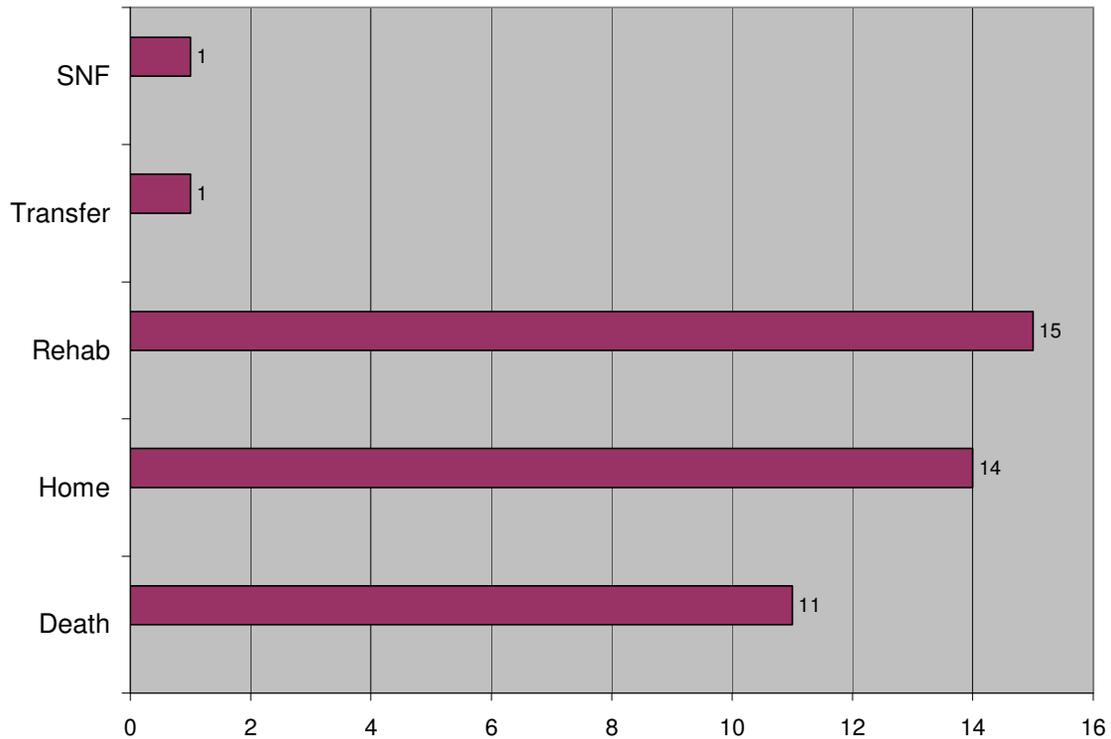
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 42)



Seventy-nine percent (n = 33) of ATR cases that had both TBI and SCI occurred on streets and highways. Five percent (n = 2) occurred in the home. Seven percent (n = 3) were in industrial settings and one case occurred in a residential institution. The place of injury was not specified in seven percent of cases (n = 3).

Figure 18  
**Discharge Disposition Following Cases with Both TBI and SCI**

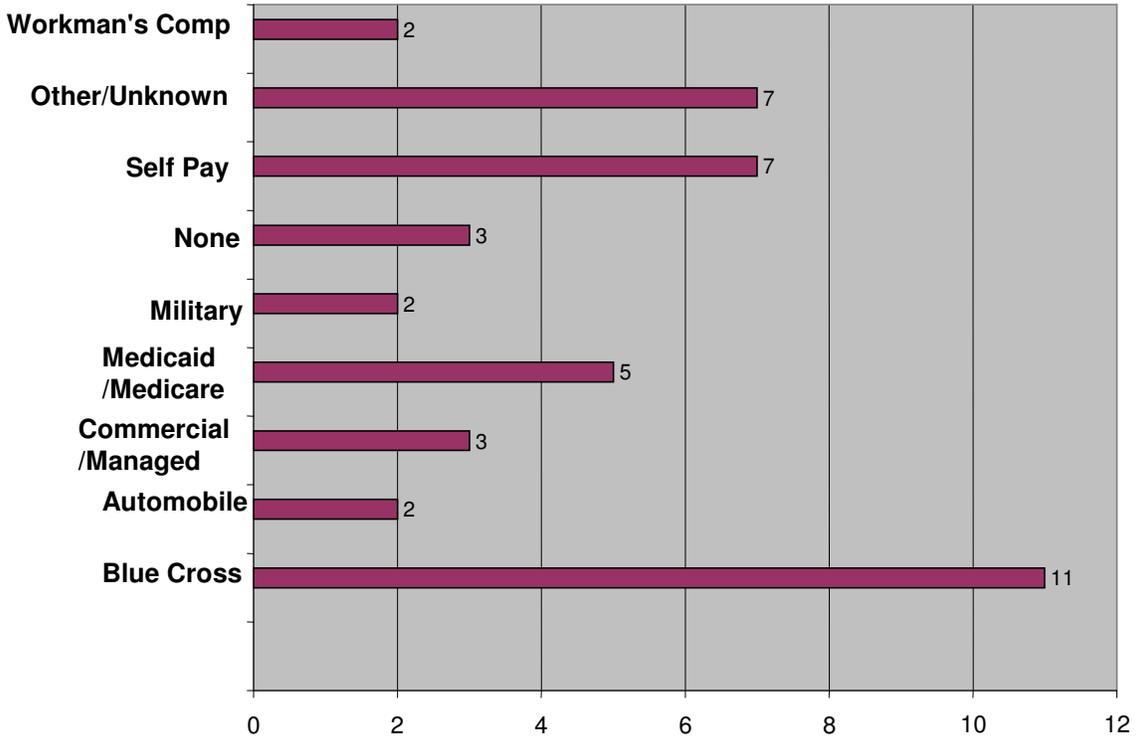
Alabama Head and Spinal Cord Registry (AHSCIR)  
January 1, 2006 – December 31, 2006  
(n = 42)



Fifteen cases (36%) with both head and spinal cord injuries were discharged to residential rehabilitation facilities. Fourteen cases (33%) were discharged home. Eleven cases (26%) died. One (2%) was transferred to another acute care facility and one case (2%) was discharged to a skilled nursing facility (SNF).

**Figure 19**  
**Payer Sources for Cases with Both TBI and SCI**

Alabama Head and Spinal Cord Registry (AHSCIR)  
 January 1, 2006 – December 31, 2006  
 (n = 42)



Blue Cross/Blue Shield paid in 11 cases (26%) that had both head and spinal cord injuries. Individuals or their families paid for their own medical care in seven cases (17%). The source of payment in five cases (12%) was Medicare or Medicaid. Military insurance paid in 2 cases (5%). Workman's compensation paid in two cases (5%). Commercial insurance or managed care paid in three cases (7%) and two cases (5%) were paid by automobile insurance. No payment was made in three cases (7%). The source of payment was not specified in seven cases (17%).